GLASGOW (W.C.)

PLASTIC BRONCHITIS.

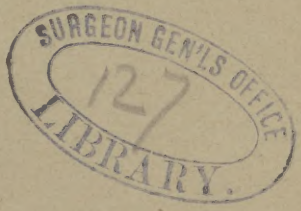
BY

W. C. GLASGOW, M.D.,

ST. LOUIS, MISSOURI.

EXTRACTED FROM THE

TRANSACTIONS OF THE AMERICAN MEDICAL ASSOCIATION.



PHILADELPHIA:
COLLINS, PRINTER, 705 JAYNE STREET.
1879.

PLASTIC BRONCHITIS.

BY

W. C. GLASGOW, M.D.,

ST. LOUIS, MISSOURI.

EXTRACTED FROM THE
TRANSACTIONS OF THE AMERICAN MEDICAL ASSOCIATION.

PHILADELPHIA:
COLLINS, PRINTER, 705 JAYNE STREET.
1879.

PLASTIC BRONCHITIS.

I PRESENTED, Mr. President, to this Section, at our last meeting in Buffalo, casts which had been expectorated by a man suffering with plastic bronchitis; the accompanying photograph of the casts was taken a few days after they had been expectorated. Owing to lack of time, I had no history to report, and it is in accordance with the resolution of the Section, as moved by Dr. Rich, that I now report the history and treatment of the case during the past year.

In addition, in order to give more interest to the report, I have endeavored to ascertain, as far as possible, the experience of leading American physicians in the disease. With this end in view, I addressed letters to many of our prominent physicians, in different sections of the country, and have received from the majority most courteous replies.

I have been fortunate enough to collect a few cases which have complete histories; the mass of the testimony, however, relates to fragmentary histories of cases. Still, sufficient has been gathered to show the comparative rarity of the disease, and some of its prominent symptoms.

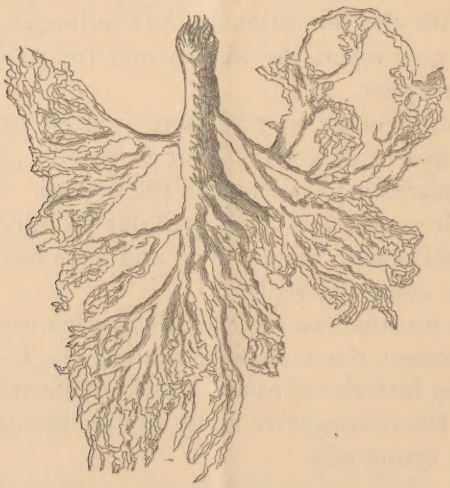
The history of the case which is the occasion of this paper is as follows:—

June 2, 1878, Dr. John Mayger, of St. Louis, brought to my office the patient, John B——, aged seventeen years. He is 5 feet 11 inches high, weighs 133 pounds, is of spare build and somewhat emaciated, having a decidedly anæmic appearance. He is of perfectly healthy parentage; mother and father both living. By occupation he was a farmer, and occasionally worked as a painter.

In early life he had many attacks of spasmodic croup, and at six years of age became affected with a pustular eruption over

the entire body, which continued in spite of treatment for over a year. With this exception, his health has been generally good, until about a year ago, when having fallen from a raft into the water, he took a violent cold and had a cough which lasted about two months. During the following six months he seemed to be perfectly well, with the exception of a slight hacking cough. He then noticed for the first time small bits of cast occasionally in the expectoration. He expresses himself as having felt a tightness or sense of oppression in the chest, or rather a feeling of want of air, which was especially apparent when painting in a close room, exposed to the odor of paints and oils. He also complained of a feeling of heaviness and stupidity, especially in the mornings, which at times rendered him incapable of continuing his work.

Fig. 1.

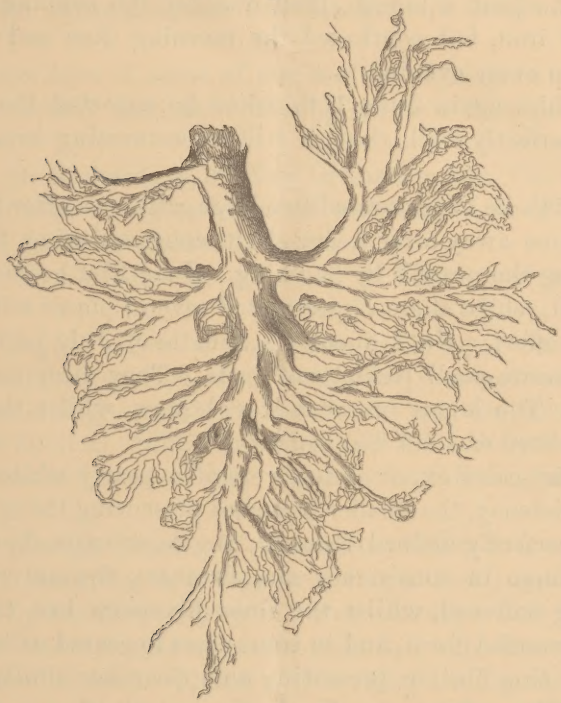


Bronchial cast, reduced one-half, from photograph.

He removed to the country, and in a few weeks noticed the entire disappearance of the fibrinous particles from the expectoration, and seeming return of perfect health. After several months, he returned to the city, and resumed his business as a painter. Bits of membrane or cast again appeared in the expectoration, and the old feeling of stupidity and oppression in the chest again became very marked. He was suddenly taken with a violent chill, which lasted several hours, and this was followed by high fever, continuing nearly twenty-four hours.

During the fever, he had frequent and violent paroxysms of coughing, with an intense feeling of suffocation, or want of air. About 10 P. M., having taken a drink of water, it was immediately vomited, and this was repeated several times. Some two hours later, during a paroxysm of coughing, a large mass was expectorated, which proved to be a bronchial cast (see Fig. 1); he immediately experienced a sense of relief; the tightness of the chest disappeared, the cough ceased, and he slept soundly till morning. Next morning, having taken a cup of tea, he complained

Fig. 2.



Bronchial cast, reduced one-half, from photograph.

of a feeling of nausea and heaviness over the epigastrium; a slight hacking cough came on, and without any effort a large mass arose in his throat, which also proved to be a large cast. (See Fig. 2.) The sense of oppression immediately disappeared, and he felt perfectly well, with the exception of a slight soreness under the middle of the sternum. Physical examination showed percussion sound to be negative; on auscultation, there was found a diminution of the respiratory murmur over

the middle of the left lung, near the angle of the scapula, where a few sub-crepitant râles of rather dry character could be heard. The respiratory murmur over both lungs was feebler than usual.

I prescribed for him ten grs. of iodide of potassium and ten drops of the syrup of iodide of iron, to be taken three times a day. He continued this treatment for ten days, when it was omitted on account of nausea. I then gave him ten-drop doses of the syrup of the iodide of iron, on sugar, twice a day after meals, and in addition ordered an inhalation of the ethereal extract of tar with carbolic acid, to be used every night. He continued this treatment about a month, then omitted the evening doses of iodide of iron, but continued the morning dose and used the inhalation every evening.

I saw him again June 17th, when he reported that he was feeling perfectly well, though still expectorating small bits of casts.

June 19th he expectorated two large casts, one after the other, which came away after a few slight coughs, during the efforts of clearing the nostrils by hawking. June 21st he came to my office, and, whilst there, expectorated several pieces without the slightest effort. Until about the middle of July he continued to expectorate small particles of casts. They disappeared then entirely. The larger branches were hollow, whilst the smaller ones consisted of solid filaments.

The first casts expectorated were of a pearly white color, of firm consistency, the smaller branches presenting the appearance of fine, perfectly defined threads; the later casts showed a decided change in consistency and firmness, the external coats appearing softened, whilst the finer filaments lost their well-defined rounded form, and in some cases appeared as bundles of disintegrating fibrillæ, presenting an appearance similar to that given to the earlier casts after having remained some time in a solution of chloral. This change in the character of the casts, I think, we can truly ascribe to the action of the remedies; whether due to the influence of the iodide of iron or of the inhalations, remains an open question. The iodide of potassium was first given on account of its well-known influence on inflammation of the bronchial mucous membrane. The iodide of iron was added for its tonic effects, and with the view of continuing the influence of the iodine. The inhalations of tar and carbolic acid were prescribed with the hope of their having an alterative

effect, in changing the specific character of the inflammation and preventing a re-formation of the casts. The happy effect of the preparations of tar in resolving chronic inflammations of the skin was considered, and a similar good effect on the bronchial mucous membrane was hoped for.

He continued the above treatment faithfully seven months, when, feeling, as he expressed it, "rawness and soreness in his lungs," he discontinued all treatment.

I saw him May 1, 1879. He states that he is, and has been during the fall and winter, in perfect health. He has gained ten pounds in weight, has lost his anæmic look, and has no cough.

The experience of some of our leading physicians in this disease will be seen from the following extracts from personal letters:—

Dr. T. G. Richardson, of New Orleans, writes, "in a practice extending over nearly one-third of a century, I have never encountered a case of plastic bronchitis."

Dr. W. H. Geddings, of Aiken, S. C., has "never met with a case."

Dr. F. Peyre Porcher, of Charleston, S. C., says, "in a hospital practice of fifteen years, with numerous post-mortems, I have never seen a single case," but he refers to one, the cast of which is in the Medical College Museum, and the history is reported in the *Transactions of the South Carolina State Medical Association*, 1874.

Dr. T. Grange Simons, of Charleston, refers to a case in his practice, "occurring in a negro child aged four years." When first seen by him, it had been ill for several days with the symptoms as of acute bronchial catarrh, and had expectorated several casts of the bronchia. It died within thirty-six hours. He notes the occurrence of two cases in the practice of Dr. J. M. F. Geddings, both of which were in adults, recurring periodically, and were dependent on bronchitis. He also notes a case as reported by Dr. T. T. Robertson, of Winsboro', S. C.

Dr. Jerome Cochrane, of Mobile, writes, "the disease is wholly unknown in this section of the country."

Dr. James H. Hutchinson, of Philadelphia, says, "during a long connection with the Pennsylvania and Episcopal Hospitals, I have only seen one well-marked case, and have never had a case under my care."

Dr. H. I. Bowditch, of Boston, writes: "I do not remember ever having recorded or treated a single case during my whole professional life, since 1835."

Dr. R. H. Fitz, of Harvard College, has "seen four specimens of casts during a period of nine years. The histories of these cases gave few and trivial symptoms; at the most a slight cough. Structurally, the casts were composed simply of cells and mucus, and I have therefore considered them to be the result of limited bronchitis, with retention and partial inspissation of secretions."

Dr. Theophilus Parvin, of Indianapolis, has "had no case" in his practice.

Dr. James T. Whittaker, of Cincinnati, O., has "had no personal experience with the disease."

Dr. Geo. P. Andrews, of Detroit, "I have never seen or heard of a case in my section."

Dr. Roberts Bartholow, of Cincinnati, O., writes: "I have seen one well-marked case in which a complete cast of the tubes on one side was expectorated down to at least the bronchioles. It came away almost entire. Microscopically, it consisted of a fine reticulation of fibres and mucous corpuscles. The case presented the ordinary signs and symptoms of capillary bronchitis, and terminated fatally by catarrhal pneumonia."

Dr. Jas. R. Leaming, of New York, has "seen two cases of plastic bronchitis, both in consultation. One of these died later of diphtheria."

Dr. Austin Flint, of New York, writes: "I have met with three cases of plastic bronchitis; one case occurred in a man in middle life, of intemperate habits, and was fatal. In a second case, I received quite an extensive cast, with the history, that the patient was a young woman, who had had repeated attacks, during which she had expectorated large quantities of similar casts. A third case was that of the late Dr. Stephen Rogers, reported in the *New York State Medical Association Transactions*, 1866, and which is now in the Museum of Bellevue Hospital."

Dr. Flint also notes a case of a patient with phthisis, in which casts of a portion of the bronchial tree were expectorated, after profuse and persistent hæmoptysis. Microscopic examination proved that these casts were formed by coagulation of the effused fibrine of the blood, and hence it was not a case of true plastic bronchitis. He also notes a case, "of a man who died of bron-

chial hemorrhage, in whom the bronchial tubes of the whole of one lung were occluded by discolored fibrine."

Dr. Gleitzman, of Ashville, records one case seen in a lady with early phthisis. She recovered.

Dr. J. M. Da Costa, of Philadelphia, writes: "I cannot recall the number of cases that I have seen in practice, but I have in my collection two fine specimens of casts of plastic bronchitis; one, very large and giving complete casts of bronchial tubes on both sides, occurred in a young girl, and it came away after an emetic: the case recovered. The second case was a man. In this case a large plug completely obstructed the left bronchial tube, and its expulsion was preceded by several hemorrhages."

Dr. Alfred Stillé, of Philadelphia, kindly sends me the full history of a case of which he has the cast, and which was reported to him by Dr. Wm. B. Lank, of Finlayville, Pa. "A. G., a blacksmith, æt. 25, of great physical power, began to suffer without any apparent cause, with shortness of breath, and a sense of constriction of the left side of the chest, and with irregular and violent action of the heart; there was no pain, cough, or fever. The dyspnœa was so severe at times as to threaten life. These symptoms continuing for two months, ascites and œdema of the legs occurred, the face was livid, the expression distressed, and lying down was impossible. A state of somnolency was almost continual. Besides the disorder of movement of the heart above mentioned, there was jugular pulsation. The left side of chest dull on percussion, right side abnormally resonant. In the left lung respiration was bronchial with sibilus; in the right, exaggerated.

"Dr. Lank took charge of the patient in the eleventh week of the attack, gave him egg-nog and iron, and applied a large blister to the left side of the chest. Within forty-eight hours, expectoration of a sero-albuminous liquid began, and moist râles were heard over the left lung; there was little or no cough. A second blister was applied on the fifth day, and, on the sixth, the patient was almost choked by coughing up a large quantity of casts of the bronchial tubes, 'white as pearl, lustrous as satin, and exhaling an extremely unpleasant odor.'

"The quantity of expectoration of this sort was nearly a quart from first to last. The casts had often to be extracted from the throat with the fingers. Directly after this expectoration breathing became free, the heart regular, and the jugular pulsation

ceased. For two months longer some casts continued to be expectorated, and, a few weeks later, the patient regained his former health."

Dr. Alison Maxwell, of Indianapolis, gives me the history of a case as reported by Dr. Thomas L. Murdock of that city.

"I was called Jan. 3, 1877, to see Florence Von C., a girl eight years of age, rather large, of light complexion, and scrofulous diathesis. She had been having violent but not frequent coughing spells, some dyspnœa, with very little expectoration and occasionally slight pain and soreness in the right side. Has also had 'light chills, followed by fever and sweating each alternate evening.' The appetite was good and she felt playful and well most of the time. This condition had existed about two months; she had been taking cough mixtures and quinine, but had not been under the care of any doctor. There was no hoarseness at any time. The larynx and trachea were healthy, and from previous history and present appearances, no trace of diphtheria or croup could be detected. Nothing abnormal could be found on percussion. The respiratory murmur could not be heard over a small, well-defined space in the region of terminal branches of bronchus leading to middle lobe. The case was thought to be one of circumscribed chronic catarrhal bronchitis, with some pneumonitis or collapse of air cells. The treatment consisted of chlorate and iodide of potassium, with chloroform and belladonna, to allay the violence of the cough, and wild cherry, cod-liver oil, and quinine for tonics; also, external applications of iodine and warm poultices. Previous to February 16th, some thick tenacious matter was expectorated, but nothing suggesting false membrane. On that day, while coughing, a dense, firm membrane about two inches in length, and one-fourth inch in diameter at the largest extremity, being a perfect cast and distinctly showing the bronchial subdivision, was coughed up. After the expulsion of this membrane, the cough and irritation almost instantly subsided with very little expectoration, and none that would be called purulent or bloody. In less than a week the lung action became normal, and no more trouble has been experienced to the present time, about two years. A microscopical examination made by Dr. Maxwell showed numerous pus corpuscles with a few red blood corpuscles."

Dr. Samuel G. Armor, of Brooklyn, says: "I have seen but few cases of the disease; I believe in all the cases, hemorrhage

either preceded or accompanied the membranous expectoration. They were all of the chronic form, and were preceded by catarrhal bronchitis. My general recollection is, that they all finally terminated in pulmonary phthisis."

Dr. Frank Donaldson, of Baltimore, states, that he has only seen one case of plastic bronchitis in this country, and this occurred in the Baltimore Almshouse and Hospital in 1853.

Dr. Henry Gibbons, Sr., of San Francisco, writes: "I have never seen a well-marked case of plastic bronchitis during a practice of fifty years."

Dr. Chas. Denison, of Denver, has never met with, or heard of a case in Colorado.

Dr. G. Baumgarten, of St. Louis, reports the following case in the January number of the *St. Louis Medical and Surgical Journal*, 1869.

"The case occurred several years ago, and it was in the practice of Dr. P. H. Weigel." The patient was "a robust man, in middle life, *potator*, of good constitution, and had been suffering from the affection for about six months. His chief symptom and cause of complaint was the frequent expectoration of the fibrinous bronchial casts in question, which was effected by violent exertions in a fit of the most intense dyspnœa, with livid face and perspiration; relief, however, immediately followed the discharge of the sputum, and there was no dyspnœa in the intervals. At the time Dr. W. first saw the patient, these seizures of cough and dyspnœa leading to the expulsion of a surprising mass of fibrine, were frequent, often occurring more than once in an hour; the number of specimens presented to me, more than a dozen larger or smaller arborescent masses (which completely filled an ordinary quinine bottle) are said to have been expelled in one day. The physical exploration of the chest gave negative results. Fever was absent and the general health suffered but little, the patient being about; after a time, emaciation took place, which was attributed however to a temporary withdrawal of the alcoholic stimulus and stricter diet. The disease improved slowly under various plans of treatment, the size of the casts and the frequency of the dyspnœic paroxysms diminished considerably; the patient finally left the city after many months of treatment, benefited, but not entirely relieved. According to later information the case must have lasted not much less than two years, but ultimately got well."

Dr. P. Gervais Robinson, of St. Louis, presented to the St. Louis Medical Society last summer a cast with the following history as reported by Dr. Edwards, of Brownsville, Mo.: "Oliver Scott, aged 30, formerly a farmer, at present keeping a restaurant. Mother died in 1868 of hæmoptysis; his only sister died at 15, disease unknown; his father is a stout, well-built man, and healthy. The patient has been troubled for twelve years with cough and spitting of blood. Sometimes the sputa would be streaked with blood, at others there would be quite severe hemorrhage. He had slight attacks of asthma prior to 1872, and for the past six years has had chills and fevers. Was called in consultation to see him for the first time on the night of November 9, 1877; found him bleeding very freely from both the lungs and the nares. The physician in attendance had been giving him large doses of acetate of lead and tannin, applying cold water to his head and neck, and giving him small pieces of ice to swallow at short intervals. Under this treatment he continued to get worse, until he became almost bloodless. Thinking that the cough was probably caused by the blood from his nose running down into his throat, I immediately applied plugs of lint soaked in liq. ferri persulph. to both anterior and posterior nares. This at once put a stop to the epistaxis, but the hæmoptysis continued and became more profuse. I then advised ten grains of gallic acid and half a drachm of fluid extract ergot every hour.

"In about fifteen minutes after taking the first dose, the bleeding was somewhat checked, and, when he raised his head to take the second dose, he was seized with a fit of coughing, and threw out a piece of fibrinous cast. The hemorrhage almost immediately ceased.

"The next morning he commenced spitting blood again, and in about an hour afterwards, he coughed up four other pieces, nearly as large as the first. He has had no hæmoptysis since, but the epistaxis continued to trouble him for some time, and I was called to re-insert the plugs on the nights of November 13th and 17th. During the whole time of his sickness (twelve years), the hemorrhage was always worse at night and seldom gave trouble during the daytime.

"The physical signs observed by me at my first visit were, diminished resonance and subcrepitant and sibilant râles in mammary region in front, and over the infra-scapular region behind;

at present, there is slight increase of resonance all over the chest; a slightly increased elevation of the ribs in breathing, and a slight diminution of chest expansion; he complains of a difficulty in breathing when he exerts himself; I think he probably has a commencing emphysema of the lungs; he tells me that he weighs now 18 lbs. more than he ever did, and feels that his health is getting better in every way."

Further notices and reports of cases will be found in the *St. Louis Medical Journal*, 1869, by Dr. Wilson; *Proceedings New York Pathological Society*, 1877, by Dr. Beverly Robinson; *Transactions New York State Medical Association*, 1866, by Dr. Stephen Rogers; *Transactions State Medical Association of South Carolina*, 1874, Dr. T. Grange Simons; *The Physician and Surgeon*, Ann Arbor, April, 1879, p. 169; as also in an article on Plastic Bronchitis in *Flint's Practice of Medicine*.

I have thus been able to note the occurrence of twenty-three cases as reported occurring in this country. Not a large number, truly, but considering the rarity of the disease as given by European writers, and considering the incomplete and unsatisfactory manner in which these statistics have been obtained, it gives us some idea of the rarity and of the symptoms of the disease. The unfortunate habit of many American physicians, of not recording their cases, makes the collection of statistics very unsatisfactory and unreliable. Probably many more cases have occurred besides those noticed, but as we have here the experience of leading physicians, living in different sections, and in centres of population, who would probably hear of or see such cases when occurring, we can consider those recorded as approximating the true number.

In European literature we find the subject thoroughly investigated by several writers.

The latest and most complete bibliography will be found in an article on Plastic Bronchitis, by Riegel, *Ziemssen's Handbook of the Diseases of the Respiratory Organs*, p. 165.

Biermer, in *Virchow's Handbuch der Pathologie und Therapie*, has collected fifty-eight cases, with a thorough investigation of the subject.

Lebert, in his book, *Klinik der Brustkrankheiten*, and in a monograph in the *Deutsches Archiv f. Klin. Medecin*, vol. vi., has still further extended the number.

Dr. T. B. Peacock, in the *Transactions of the London Pathologi-*

cal Society, and in the *Medical Times and Gazette*, 1854 (reprinted in the *American Journal of Medical Sciences*, 1855), notices thirty-four cases, some of them taken from German authorities.

A report of two cases, with a full account of the disease, will be found in Watson's Lectures, and the disease is considered in several of the text-books on general medicine.

The latest report on plastic bronchitis will be found in *Schmidt's Jahrbuch*, vol. 163, p. 28, 1874. Kretschy reports ten cases in addition to those collected by Biermer (1867), three of which are acute, and seven chronic. To which may be added four cases of Chevstok (*idem*, vol. 173, p. 136).

Plastic bronchitis, croupous bronchitis, or bronchial polypus, as it has been variously termed, is an inflammation of the bronchial mucous membrane, characterized by a fibrinous exudation. It may occur in the bronchi in connection with a similar exudation in the larynx and trachea; it may develop by continuity from croupous pneumonia, or it may occur primarily and be limited to the bronchi. Plastic bronchitis is the term properly given to this last class of cases, where the exudation occurs in the bronchi, without a similar condition existing either in the laryngo-trachea or in the alveolæ.

The number of cases recorded has been comparatively few. Biermer (1867), after a most exhaustive study of European records, could only find 58 cases, to which may be added 41 cases noticed by Peacock, which probably include many already reported by German authorities. Lebert has found 34 cases in which the histories are so imperfect as to render the exact nature of the disease doubtful. To these we may add the 10 cases reported by Kretschy (1874), and the 4 cases of Chevstok, making in all, in German reports, 72 reliable cases.

The disease occurs more frequently in males than in females. According to Biermer the ratio is 3 : 1; whilst Lebert gives it 3 : 2. Peacock also finds it more frequent in the male sex.

The earliest age at which it has been observed is four years (Simons, Charleston, S. C.), the oldest, seventy-two (Goumœns). Wunderlich and Murdock have each reported cases of eight years, and Biermer one of five. Most frequently it is found between puberty and the fiftieth year; only four cases have been observed beyond the fiftieth year. It is said to occur most frequently in the late spring, about the time when pneumonia is most prevalent.

Menstruation and pregnancy have a seeming influence upon it. Schnitzler gives a case where the attacks coincided with menstruation, and mentions several occurring during pregnancy. But this may be a mere coincidence. Oppolzer mentions a case which came on monthly at the time of the catamenia, whenever this was absent. The etiology of the disease is very obscure. In the majority of cases, it seems to have arisen from exposure as in ordinary bronchitis. In a certain number of cases, the tubercular or scrofulous diathesis has been present, but in far the largest number, the persons attacked seemed to have been in previous good health.

Biermer is inclined to believe that tubercle and scrofula bear the same relation to the disease as will be found in any other debilitating influence, and states emphatically in contradiction to the views of Rollett, that there is no more connection between plastic bronchitis and phthisis, than between it and ordinary bronchitis. Hemorrhages, and the occurrence of effused fibrinous bronchial plugs in phthisical cases, as is shown in the two cases cited by Dr. Flint, may have caused the seeming connection between the two diseases.

The view of Stokes, that the lining membrane of the bronchi loses the mucous and partakes more of the serous character as it approaches the periphery of the lungs, is denied by Peacock, who "can only assume that the exudation depends on a specific character of inflammation resulting from some peculiarity of the individual."

The casts when ejected are of a pearly white color, unless discolored by blood; the larger portion hollow and filled with air and mucus; the smaller branches are solid and subdivide until forming fine threads. The cast is formed of a series of concentric layers of fibrin; it is nearly cylindrical, giving a mould of the bronchial tree and its ramifications, and is of considerable toughness and firmness. The tubes in which it is most generally found are those of the third and fourth size. The casts with shorter branches are said to come from the upper part of the lungs. Microscopically they consist essentially of fibrine, containing occasionally products of inflammation.

Plastic bronchitis occurs in an acute and in a chronic form; the acute type is very rare: Lebert has only been able to find seventeen cases reported. The duration of the disease in fatal cases, which comprises one-half of all (Biermer), is between three

and fourteen days. The disease commences as a rule with the symptoms of simple bronchial catarrh; after a few days a sense of heaviness over the chest is experienced, and a chill followed by high fever comes on; the cough becomes violent and occurs in repeated paroxysms, the fever increases, and the dyspnœa becomes intensified until the patient experiences a sense of intense suffocation. Portions of membrane mixed with catarrhal sputa are expectorated with great effort, until at last the cast is thrown off, when there is a comparative relief from all symptoms, at least for the time being. In fatal cases there is a continuation and constant aggravation of symptoms until at last the patient becomes somnolent, ceases to expectorate the casts, and, soon becoming unconscious, dies.

At times the disease simulates a pneumonia, with the usual chill, and pain in the side. The casts may even be wanting in the expectoration, and in one case mentioned by Biermer there was no cough, probably due to inability. Dyspnœa is a constant symptom, and the fever has been absent in only one case reported (Caspar). The physical signs present are greater or less suppression of the respiratory murmur over the affected bronchi. Subcrepitant and occasionally sibilant râles are heard when the cast has become loosened. M. Valleix mentions a peculiar clicking valvular sound, the "*petite bruit de soupape*," which has also been noticed by Cazeaux, Barth, Girondet, and Gordon, as being occasionally heard over the affected part.

Percussion sound is generally negative. A typical illustration of the acute form of the disease will be found in the case of Ruck (*The Physician and Surgeon*): "A woman fifty-seven years old, of previous good health, and healthy parents, suffered for two preceding years from occasional cough and shortness of breath upon exertion, constipated bowels and diminished appetite. Upon taking cold she had rather a severe chill followed by fever, a feeling of lassitude and weakness, thirst, increased cough and dyspnœa. The patient became weak very rapidly, the cough assuming a violent and paroxysmal form, with sense of great dyspnœa. A short time before death, during such paroxysms, which were accompanied by loud mucous râles, the patient expectorated three mucous balls, after each of which she experienced temporary relief.

"Professor Chevstok, now called in consultation, found the patient extremely weak and sinking rapidly, the voice, however,

not hoarse and the cough without croupous tone, the jugular veins moderately distended. The chest appeared moderately broad, long, slightly arched; respiration increased in frequency and motion of the left side diminished; the intercostal spaces contracting much less during inspiration than on the right side. Percussion showed normal lung sound. No respiratory sound over the whole of the left lung except toward the root, where bronchial breathing was heard; on the right side the respiration was exaggerated; the pulse was small and weak, 104. The sputa continued—mostly of mucus, and three moderately solid balls about one and a half to two centimetres in diameter, apparently of grayish-white mucus, and when disentangled presented the characteristic tree-like appearance of the bronchi. The patient continued to sink rapidly, did not vomit nor expectorate any more casts, became somnolent, unconscious, and died on the second day."

Also the following case of Kretschy, *Wiener. Med. Wochenschrift*, xxiii., 1873.

The patient was a young man who had had a hacking cough for three weeks, otherwise entirely well. Suddenly he had a chill followed in one and half hours by fever, with great dyspnœa and violent attacks of coughing. The next morning after a most intense feeling of suffocation, a reddish fleshly mass was ejected. His breathing became at once free, a slight hacking cough remained, with a slight increase in temperature, languor, and a pain in his head.

Three days afterwards he was examined by Prof. Duchek. His respiration was quiet, and he had slight catarrhal fever and slight cough. There was no dulness on percussion. On auscultation a few mucous râles were heard posteriorly over right lung. In the course of the morning a violent attack of suffocation and cough came suddenly on and continued until patient had expectorated a reddish mass, which, when spread in water, showed a complete cast of the bronchus; it was eleven centimetres long.

5th day. No fever in the morning; in the afternoon he had again a chill followed by fever, when another cast was expectorated with the previous symptoms.

9th, *10th*, *11th days.* High fever with intense dyspnœa, moist râles numerous over right lung: after an emetic, two casts were expectorated. Died on 16th day.

At the autopsy, the trachea and bronchi were found injected

and filled with mucus. A fibrinous cast occupied the middle and lower portion of the right bronchus. The left lower lobe, as also the portion of upper lobe contiguous to it, as well as the posterior part of the right lung, were empty of air and infiltrated with bloody serum. The lower bronchial tubes of the right lung were partly filled with a yellow fluid and partly with fibrinous mucus.

In the chronic form of the disease there are no constant and definite symptoms. It may present, in the beginning, symptoms similar to those found in the acute form; these, however, subside after the ejection of the cast; a periodic expectoration of bits of casts, together with occasional spells of dyspnœa, may be afterwards the only apparent symptoms. As a rule, however, the chronic form commences with the ordinary symptoms of a mild bronchitis, which is sooner or later accompanied by the expectoration of fibrinous pieces. The general health of the patient is little changed; there is usually no fever; dyspnœa is occasionally apparent, previous to the expectoration of the casts, which occurs at greater or less intervals. This condition may continue for years. Walshe observed a case in which the disease continued with intermissions for fourteen years. Nichols reports in his case that pieces of casts were expectorated daily for seven years, after which the patient recovered.

Hemorrhage occurred in about a third of the cases noted. (Biermer.) At times it precedes the expectoration of casts, at times accompanies it; it may be slight, and again in other cases it may be very profuse.

The diagnosis of plastic bronchitis rests entirely on the presence of casts in the expectoration; a discrimination between this and laryngeal croup will be easy, from the presence or absence of laryngeal symptoms. The only cases which may give room for doubt are those of croupous pneumonia, in which small particles of fibrinous pieces are ejected; and cases of bronchial hemorrhage in which moulds of the tubes are formed from the fibrine of the effused blood.

Biermer gives the differential diagnosis between these two conditions as follows: the moulds of the different ramifications are never so perfect in the fibrinous plugs as in the plastic casts; in color they are not so pearly white, and are less homogeneous; they are different in form and structure, the casts being formed of laminated concentric layers. In the plugs the blood is inti-

mately mixed with the fibrine, whilst in the casts it is superficial and may be wiped off. The prognosis of chronic plastic bronchitis is generally favorable. In persons of a tubercular diathesis it may be the provoking cause of the disease. The records show that few of the whole number of cases have developed into pulmonary phthisis. Emphysema is a much more common sequence.

Oppolzer relates a fatal case where the patient died from a lodgment of a large cast in the glottis.

In the treatment of plastic bronchitis attention must be given to two points: to promote the expectoration of the membrane, and to prevent its recurrence. To accomplish the first, inhalations of lime-water (Wunderlich) bicarbonate of soda and lactic acid are indicated. When the casts are loosening, an emetic, or the hypodermic injection of apomorphia, has given good results. (Riegel.)

The remedy that has been most generally recommended is the iodide of potassium (Wunderlich, Thierfelder, Sklarek). It is claimed to have the property of loosening and disintegrating the exudation.

The mercurials are strongly advised by Biermer, Peacock, Thierfelder, and other writers. Counter-irritation is recommended; a blister certainly accomplished good results in the case reported by Prof. Stillé. To prevent the re-formation of the exudation, remedies that seem to have an influence on the mucous membrane should be used; theoretically cubebs and the balsams are indicated; iodide of potassium and muriate of ammonia have been highly recommended. In my own case, I believe, the good results attained were due to the inhalation of tar and carbolic acid; the softened condition of the latter casts, and especially the disintegration of the finer filaments, would seem to prove this. The strength of the patient should be built up with tonics, and when phthisis is threatening, cod-liver oil and arsenic are indicated. The removal of the patient to the pure air of the country from the dust and smoke-laden atmosphere of towns will be a prime necessity, and the rules of hygiene in relation to climate, habitation and clothing must be strictly applied.